IN THE CLAIMS

Please amend the claims as follows:

---

1. (CURRENTLY AMENDED) A subscriber loop interface circuit apparatus comprising:

a signal processor having sense inputs for a sensed tip signal and a sensed ring signal of a subscriber loop, wherein the signal processor generates a linefeed driver control signal in response to the sensed signals, wherein the signal processor resides on ~~an~~ a same integrated circuit die as a codec for bi-directional communication of voiceband data between the analog subscriber loop and a digital interface of the signal processor.

2. (ORIGINAL) The apparatus of claim 1 wherein the sensed tip signal includes first and second sensed tip voltages, wherein a difference between the first and second sensed tip voltages is proportional to a tip current, wherein the sensed ring signal includes first and second sensed ring voltages, wherein a difference between the first and second sensed ring voltages is proportional to a ring current.

3. (ORIGINAL) The apparatus of claim 1 wherein the signal processor is a complementary metal oxide semiconductor (CMOS) integrated circuit.

4. (ORIGINAL) The apparatus of claim 1 wherein the signal processor calculates common mode and differential mode components of the subscriber loop.

5. (CURRENTLY AMENDED) An apparatus comprising:

a signal processor generating subscriber loop control signals in response to a sensed tip signal and a sensed ring signal of a subscriber loop; and

a linefeed driver portion for driving the subscriber loop in accordance with the subscriber loop control signals, the linefeed driver portion providing the sensed tip and ring signals, wherein each of the linefeed driver portion and the

signal processor resides on an integrated circuit die, wherein the signal processor resides on a same integrated circuit die as a codec for bi-directional communication of voiceband data between the analog subscriber loop and a digital interface of the signal processor.

6. (ORIGINAL) The apparatus of claim 5 wherein the signal processor and the linefeed driver portion reside on a same integrated circuit die.

7. (ORIGINAL) The apparatus of claim 5 wherein the signal processor and the linefeed driver portion reside on separate integrated circuit die in separate integrated circuit packages.

8. (ORIGINAL) The apparatus of claim 5 wherein the signal processor and the linefeed driver portion reside on separate integrated circuit die within a same integrated circuit package.

9. (ORIGINAL) The apparatus of claim 5 wherein the integrated circuit die is a complementary metal oxide semiconductor (CMOS) integrated circuit.

10. (ORIGINAL) The apparatus of claim 5 wherein the signal processor computes common mode and differential mode components of the subscriber loop.

11. (ORIGINAL) The apparatus of claim 5 wherein the linefeed driver portion comprises:

power circuitry providing battery feed to a ring node and a tip node of the subscriber loop in accordance with the subscriber loop control signals; and

sense circuitry providing the sensed tip and ring signals, wherein the sensed tip and ring signals correspond to a tip current and a ring current of the subscriber loop.

12. (ORIGINAL) The apparatus of claim 11 wherein the sense circuitry comprises:

a tip resistor series-coupled to the tip node and the power circuitry;

a pair of tip sampling resistors one end of each tip sampling resistor connected to opposite ends of the tip resistor, the other end of each tip sampling resistor forming a tip sense node;

a ring resistor series-coupled to the ring node and the power circuitry;

a pair of ring sampling resistors one end of each ring sampling resistor connected to opposite ends of the ring resistor, the other end of each ring sampling resistor forming a ring sense node.

13. (ORIGINAL) The apparatus of claim 11 wherein the sensed tip signal comprises first and second sensed tip voltages, wherein a difference between the first and second sensed tip voltages is proportional to the tip current, wherein the sensed ring signal includes first and second sensed ring voltages, wherein a difference between the first and second sensed ring voltages is proportional to the ring current.

14. (ORIGINAL) The apparatus of claim 11 wherein the power circuitry comprises:

a tip control circuit, wherein the tip control circuit increases a tip node voltage in response to a first tip control signal, wherein the tip control circuit decreases a tip node voltage in response to a second tip control signal; and

a ring control circuit wherein the ring control circuit increases a ring node voltage in response to a first ring control signal, wherein the ring control circuit decreases a ring node voltage in response to a second ring control signal.

15. (CURRENTLY AMENDED) A subscriber loop interface circuit apparatus comprising:

a signal processor having sense inputs for a sensed tip signal and a sensed ring signal of a subscriber loop, wherein the signal processor computes common mode and differential mode components of the subscriber loop; and

a codec for converting digital voiceband data from a digital voiceband interface of the signal processor to analog voiceband data for communicating to the subscriber loop, the codec providing bi-directional voiceband data conversion between the analog subscriber loop and the digital voiceband interface of the signal processor, the codec and signal processor residing within a common integrated circuit.

16. (ORIGINAL) The apparatus of claim 15 further comprising:

a linefeed driver portion for driving the subscriber loop in accordance with subscriber loop control signals provided by the signal processor, the linefeed driver portion providing the sensed tip and ring signals.

17. (CURRENTLY AMENDED) The apparatus of claim ~~15~~ 16 wherein each of the signal processor and the linefeed driver portion resides on an integrated circuit die.

18. (ORIGINAL) The apparatus of claim 16 wherein the signal processor and the linefeed driver portion reside on separate integrated circuit die within a same integrated circuit package.

19. (ORIGINAL) The apparatus of claim 16 wherein the signal processor and the linefeed driver portion reside on a same integrated circuit die.

20. (ORIGINAL) The apparatus of claim 16 wherein each of the signal processor and the linefeed driver portion resides on separate integrated circuit die in separate integrated circuit packages.

21. (CURRENTLY AMENDED) A subscriber loop interface circuit apparatus comprising:

~~an integrated circuit~~ a signal processor configured to receive a sensed tip signal and a sensed ring signal of a subscriber loop, wherein the signal processor generates subscriber loop linefeed driver control signals in response to the sensed tip and ring signals; and ~~, the signal processor including a codec.~~

a codec for converting digital voiceband data to analog voiceband data for the subscriber loop, the codec and signal processor residing within a same integrated circuit.

22. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor computes common mode and differential mode current and voltage components of the subscriber loop.

23. (PREVIOUSLY PRESENTED) The apparatus of claim 21 further comprising:

a linefeed driver for controlling the subscriber loop in response to the linefeed driver control signals, wherein the linefeed driver does not reside within a same integrated circuit as the signal processor.

24. (PREVIOUSLY PRESENTED) The apparatus of claim 23 wherein the linefeed driver does not compute any common mode subscriber loop voltages or currents, wherein the linefeed driver does not compute any differential mode voltages or currents of the subscriber loop.

25. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor is a complementary metal oxide semiconductor (CMOS) integrated circuit.

26. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor operates in a positive voltage range with respect to ground to generate the linefeed driver control signals for controlling a linefeed driver operating at a negative d.c. voltage offset relative to the signal processor, wherein the offset is at least approximately 40 VDC.

27. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the sensed tip signal includes first and second sampled tip voltages, wherein a difference between the first and second sampled tip voltages is proportional to a subscriber loop tip current, wherein the sensed ring signal includes first and second sampled ring voltages, wherein a difference between the first and second sampled ring voltages is proportional to a subscriber loop ring current.

28. (PREVIOUSLY PRESENTED) The apparatus of claim 23 wherein the linefeed driver further comprises:

a tip control circuit; and

a ring control circuit, wherein the tip and ring control circuits vary tip and ring node voltages of the subscriber loop in response to the linefeed driver control signals.

29. (PREVIOUSLY PRESENTED) The apparatus of claim 28 wherein the tip and ring control circuits provide d.c. isolation between the signal processor and the subscriber loop.

30. (PREVIOUSLY PRESENTED) The apparatus of claim 28 wherein the tip control circuit further comprises:

a first transistor of a first type having an emitter coupled to receive a first tip control signal of the linefeed driver control signals;

a second transistor of a first type having an emitter coupled to receive a second tip control signal of the linefeed control signals, wherein a base of the first and second transistors is coupled to a common signal ground node;

a third transistor of a second type having a collector coupled to a collector of the first transistor and a tip line of the subscriber loop;

a resistor having a first end coupled to the emitter of the third transistor to form a battery feed node, wherein a second end of the resistor coupled to a base of the third transistor and a collector of the second transistor.

31. (PREVIOUSLY PRESENTED) The apparatus of claim 30 wherein the first type is a PNP bipolar junction transistor, wherein the second type is an NPN bipolar junction transistor.

32. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor performs at least one of the subscriber loop supervisory functions of ring trip, ground key, and off-hook detection.

33. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor performs subscriber loop ring control, supervision, codec, and hybrid functions.

34. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor further comprises a programming interface to enable programmatic control of at least one of the following parameters: battery control, battery feed state control, voiceband data amplification, voiceband data level shifting, longitudinal balance, ringing current, ring trip detection threshold, off-hook detection threshold, and audio output signal termination impedance for

voiceband communication signals superimposed on the linefeed driver control signals.

35. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the signal processor superimposes outgoing analog voiceband communications on the linefeed driver control signals.

b1

36. (PREVIOUSLY PRESENTED) The apparatus of claim 21 wherein the linefeed driver control signals include separate tip control signals and ring control signals.